William of Sherwood on Necessity and Contingency

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Abstract

In [14], I presented three 13th-century approaches to modality and modal logic, focusing on the well-developed and clearly articulated views of William of Sherwood (fl. 1250), and contrasting them with the more nascent and brief views found in Pseudo-Aquinas and Aquinas. That paper focused on Sherwood's modal theory as found in his *Introductiones ad Logicam* [10], without attempting to integrate it with what he has to say about modes, modality, and modal reasoning in his other main treatise, the *Syncategoremata* [11]. This paper extends [14] by doing this integration.

Keywords: 13th century, contingency, modal logic, mode, necessity, syncategorematic terms, William of Sherwood

1 Introduction

In [14], I presented three 13th-century approaches to modality and modal logic, focusing on the well-developed and clearly articulated view found in William of Sherwood's (fl. 1250) *Introductiones ad Logicam* [10], and contrasting them with the more nascent and brief views found in Pseudo-Aquinas's *Summa totius logicae Aristotelis* and Thomas Aquinas's short, early treatise *De propositionibus modalibus*. There, we considered the three authors' definitions of *mode* and *modal proposition*; the ways in which modal propositions can be constructed and classified according to their quality, quantity, and whether they are *de re* or *de dicto* (or adverbial or nominal); their truth conditions; the inferential relations that hold between these propositions; and the treatments of modal syllogisms.

Of the three accounts considered in that paper, Sherwood's was by far the most sophisticated and consistent; this despite the fact that he does not discuss modal syllogisms in his *Introductiones* (or indeed in any other known extant text). But at the time, I focused on Sherwood's modal theory as found in his *Introductiones* without attempting to integrate it with what he has to say about modes, modality, and modal logic in his other main treatise, the *Syncategoremata* [11], preferring instead to compare his analysis with two contemporary texts. As a contribution to our understanding of modality and modal logic in the 13th century, this paper extends the previous analysis of Sherwood on

modality in [14] by doing this integration. This paper has four main parts: First, in §2, I introduce William of Sherwood and discuss his importance for the study of the history of logic generally and modal logic specifically. In §3 we provide the context for his discussion of modal terms in the *Syncategoremata* by explaining the subgenre of medieval logic it is situated in, and why one would expect to find modal terms in it. With this background in place, the main contribution of the paper is in §4, an exposition and analysis of Sherwood's chapter on modal terms in the *Syncategoremata*. This material is supplemented in §5 by consideration of what Sherwood has to say about necessity and contingency in the other chapters. We conclude in §6, outlining scope for future work and some of the limitations of the present study.

2 Who is William of Sherwood, and why should we care about him?

This is not the place to rehearse the medieval history of logic more generally nor indeed of modal logic more specifically; the reader interested in such a comprehensive overview is directed to [16]. What is important to know is that the 13th century was a period of both consolidation—as the recently translated texts of Aristotle and Avicenna circulated amongst the newly-birthed universities—and of invention—as these texts provided European logicians with new sources for innovation and development. By the middle of the 13th century, the establishment of the universities of Paris and Oxford fifty years earlier and the foundation of their curriculum upon the *trivium* (the disciplines of logic, grammar, and rhetoric) created a need for textbooks on these topics. Between 1240 and 1260, four influential textbooks were produced by authors whose names and identities we know (albeit some to a lesser degree). These are the *Introductiones ad Logicam* by William of Sherwood [10,12]; Roger Bacon's *Art and Science of Logic* [2]; Lambert of Auxerre's *Summa Lamberti* [9,4]; and Peter of Spain's *Summulae Logicales* [3].

Of these books, Sherwood's is the most interesting because it is one of the earliest and was directly influential on the succeeding books—Bacon even says, in his *Opus tertium* (1267), that Sherwood was "much wiser than Albert [the Great]; for in *philosophia communis*, no one is greater than he" [10, p. 6]. Sherwood was born in the early 13th century, probably between 1200 and 1205, and died sometime between 1266 and 1272. Though records of his early life are uncertain, from references by other scholars (not just Bacon) to him and his works, it seems likely that Sherwood was teaching logic at the University of Paris between 1235 and 1250, and then became a master at Oxford in 1250 [11, p. 3]. As a result, Sherwood is one of the earliest named writers we know of in the *logica nova* tradition, the tradition of logic that built upon Aristotle but extended it with the introduction of two new areas of study: the study of the properties of terms (*proprietates terminorum*), and of syncategorematic words (*syncategoremata*). The topic of the properties of terms, which include signification, supposition, copulation, and appellation, makes up one chapter of his *Introductiones*, which also covers such basic logical notions as proposi-

tions, predicables, syllogisms, different types of non-syllogistic arguments, and sophisms and sophistical reasoning. But syncategorematic words were important enough to get a treatise of their own.

There is no clear evidence as to when the *Syncategoremata*, or *Treatise on Syncategorematic Words*, was written. Kretzmann argues that "although Sherwood exhibits a higher level of logical sophistication" in the *Syncategoremata* than in the *Introductiones*, he "regularly omits details and ignores technical distinctions he had laid down in the earlier book"; as a result, Kretzmann concludes that the *Syncategoremata* was likely written quite awhile after the *Introductiones* [11, p. 6]. The text was first edited by O'Donnell [8] and translated into English by Kretzmann [11]. A more recent Latin edition, along with a German translation, was produced by Kann and Kirchhoff [13]. All Latin references are taken from [8] because I did not have access to [13] while completing the paper (see §6 for a further discussion of this).

Kretzmann describes this text as "an advanced treatise", designed for students who have already mastered the basics found in the *Introductiones*. After a short introduction where Sherwood introduces the topic and provides foundational definitions, the text is divided up into chapters each covering a specific syncategorematic term or group of related syncategorematic terms. These include: *omnis* ('every'/'all'); *totum* ('whole'); *dictiones numerales* (number words); *infinita in plurali* ('infinitely many'); *uterque* ('both'); *quaelelibet* ('of every sort'); *nullus* ('no'); *nihil* ('nothing'); *neutrum* ('neither'); *praeter* ('but'); *solus* ('alone'); *tantum* ('only'); *est* ('is'); *non* ('not'); *necessario* ('necessarily') and *contingenter* ('contingently'); *incipit* ('begin') and *desinit* ('ceases'); *si* ('if'); *nisi* ('unless'); *quin* ('but that'); *et* ('and'); *vel* ('or'); *an* ('whether'/'or'); *ne* (an enclitic negating particle); and *sive* ('whether... or'). Naturally, our interest here is the chapter on *necessario* and *contingenter*, though some relevant material is also found in other chapters.

3 What are syncategorematic words?

Sherwood opens his treatise with the following claim:

> In order to understand anything one must understand its parts; thus in order that the statement may be fully understood one must understand the parts of it [11, p. 13]. [1]

Understanding the parts that make up a statement is the central focus of medieval treatises on the properties of terms and on syncategorematic terms. Sherwood's introduction to the *Syncategoremata* proceeds to a definition of 'syncategoremata' or 'syncategorematic term' via a series of binary divisions, resulting in a complete classification of the parts of statements. This classification is represented in Figure 1.

The first division is between the *principal* parts of the statement, that is,

[1] *Quid ad cognitionem alicujus oportet cognoscere suas partes; ideo ut plene cognoscatur enuntiatio oportet ejus partes cognoscere* [8, p. 48].

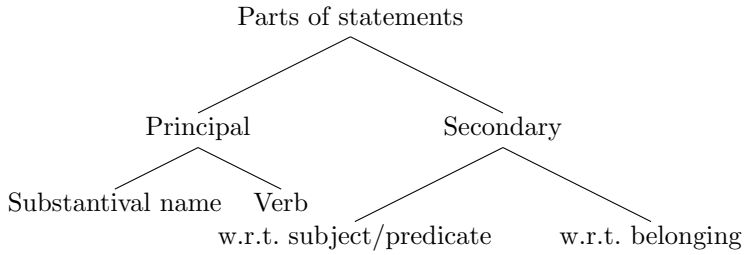

Fig. 1. Sherwood's classification of parts of statements.

substantival names (*nomen substantivum*) and verbs (*verbum*), and the *secondary* parts of a statement, which are 'determinations' of the principal parts. As Kretzmann notes, "*determinatio* is a technical notion in medieval logic" [11, p. 14], deriving from the notion of secondary substance outlined in Aristotle's *Categories* 3b10ff, where secondary substances are distinguished from primary substances by means of certain qualifications. While this section of the *Categories* is discussing metaphysics rather than language or logic, the parallel with the parts of speech is clear: Substances are either primary (without qualification) or secondary (with qualification); the parts of speech are either principal (the unqualified or undetermined parts without which a statement or sentence cannot exist) or secondary (the parts that qualify or determine the principal parts).

These principal parts, substantive names (or nouns) and verbs, are parts of speech that can be used as subjects and predicates of sentences; furthermore, they are principal because a complete statement can be made with these parts and no others. A name (or noun or *nomen*) is, per Sherwood's *Introductiones*, "an utterance significant by convention, apart from time, finite [2] and direct [3], no part of which taken by itself signifies anything" [10, p. 23] [4]; this definition distinguishes names from (a) non-significative words, (b) words which signify but not by convention, (c) sentences and phrases, and (d) verbs. The substantive names include general names like 'human' and 'animal', proper names like 'Socrates' and 'Sara', and substantivised adjectives such as 'the white [thing]'. A verb is "an utterance significant by convention, together with time, finite and direct, no part of which taken by itself signifies anything" [10, p. 24]; that is, verbs are distinguished from names by being tensed. [5] What ties these words

[2] A *finite* term, in medieval parlance, is one which signifies a determinate or definite number of things. Infinite terms are the complements of finite terms. For instance, 'man' is a finite term (and hence a noun), and 'non-man' is an infinite term.

[3] A term is *direct* (Lat. *recte*) if it is in the nominative case (or indicative mood, for verbs). Sherwood notes that this is the logician's definition of a noun, under which oblique cases of terms are not nouns.

[4] At the time of writing, I did not have access to a Latin edition of the *Introductiones*; see the conclusion of this paper.

[5] In giving these definitions, Sherwood is drawing upon the earlier grammatical tradition due to Abelard via Priscian and going all the way back to Dionysius of Thrax [1,5].

together is that they are significative, that is, they have meaning in isolation from other words. It is the properties of *these* words, (signification, supposition, copulation, and appellation), that form the topic of the chapter on the properties of terms in Sherwood's *Introductiones*. As a result, they are *not* our present focus. However, as Kretzmann points out, "some understanding of these notions is essential for a thorough understanding of Sherwood's treatment of syncategorematic words" [11, p. 5], so we will provide the necessary background information as required.

Secondary parts "are not necessary for the statement's being", and include things such as "the adjectival name, the adverb, and conjunctions and prepositions" [11, p. 13].[6] They are divided into two types, those which are "determinations of principal parts in respect of the things belonging to them" and those which are "determinations of principal parts insofar as they are subjects or predicates" [11, pp. 14–15].[7] The distinction here is between words that limit the scope of a noun or a verb and those that affect the way the noun or verb functions as a grammatical or logical subject or predicate in a statement. For instance (to use the examples Sherwood provides), in 'white man' (*albus homo*), 'white' is a secondary part of the first type; it provides a qualification of something that belongs to the word 'human'[8], while in 'every human', 'every' does not provide a qualification of a thing or things which are human, but instead says something about the relationship between the subject of the sentence and the predicate. What this something is will depend not merely on the phrase alone, but also where that phrase occurs in the sentence: For in "Every human is an animal", 'every human' will not be given the same analysis as it will in "An animal is every human".

It is for this reason—that the signification of a phrase like 'every human' is only knowable in a complete grammatical context, and not in isolation—that secondary parts of the second type are called *syncategorematic*, that is "'*sin-*'—i.e., 'con-'—and '*categoreuma*'—i.e., 'significative' or 'predicative', for a syncategorematic word is always joined with something else in discourse" [11, p. 16][9], where a *categoreuma* or *categorematic word* is one that is either a primary part, or a secondary part of the first type.

So here we have our final definition:

Definition 3.1 (Syncategoremata) *A* syncategorematic word *or* term *is a*

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[6] *non sunt necessaria ad esse enuntiationis... nomen adjectivum et adverbium et conjunctiones et praepositiones* [8, p. 48].

[7] *quaedam sunt determinationes partium principalium ratione suarum rerum... quaedam sunt determinationes partium principalium in quantum sunt subjecta vel praedicata* [8, p. 48].

[8] Latin *homo* refers to humans of any gender; the addition of the word *albus*, with masculine grammatical gender, not only restricts *homo* to those humans which are white, but also to those humans which are male. Because English is not as strongly gendered as Latin is, it is sometimes hard to reproduce these subtleties in translation. Nevertheless, I will in general use 'human' for unmodified *homo*, but 'man' or 'woman' where appropriate for modified *homo*.

[9] *'sin' quod est 'con' et 'categoreuma' quod est 'significativum' vel 'praedicativum' quasi conpraedicativum; semper enim cum alio jungitur in sermone* [8, p. 48].

secondary part of a statement which is a determination of the principal parts of the statement with respect to their being subjects and predicates.

From the preceding definition, it should be clear that 'necessarily', 'contingently', and many other modal adverbs are syncategoremata: They are determinations of the principal parts of a statement in so far as those parts are subjects or predicates.

Here it is worth noting that Sherwood *only* considers modal *adverbs* in his discussion of syncategorematic terms. This hearkens back to his discussion of modes and modality in the *Introductiones*, in which he admits only adverbs as modes, unlike Aquinas and Pseudo-Aquinas who also allow modal adjectives (e.g., "That Socrates is a man is necessary"), cf. [14, p. 391].

4 Necessity and contingency as syncategoremata

In this section, we work through the chapter on modal syncategorematic terms, providing an analysis of and commentary on Sherwood's views.

First, Sherwood notes that such words can be used either categorematically or syncategorematically, which brings to light a point we have not yet made and so should make now: While we speak of 'categorematic terms' and 'syncategorematic terms', this is somewhat sloppy usage. Instead, we should speak of the *uses* of terms: For some terms are sometimes used categorematically—for instance, when we speak of 'the whole man' (*omnis homo*)—and sometimes used syncategorematically—for instance, when we speak of 'every man' (*omnis homo*)—while other terms can be used only categorematically and others only syncategorematically.[10] The focus in this chapter is, naturally, the syncategorematic use of the terms, and we will continue to sometimes speak of 'syncategorematic terms' as opposed to 'terms used syncategorematically'.

Sherwood argues that modal adverbs such as 'necessarily' can be used both categorematically (that is, determining the verb it modifies "in respect of the thing belonging to it" [11, p. 101][11]) and syncategorematically (that is, determining it "in respect of the composition belonging to it, or insofar as it is a predicate" [11, p. 101][12]). In support of this he gives the following example [11, p. 101][13]:

The heaven moves necessarily. (1)

There are two ways that (1) can be understood. In the first case, "it signifies... that the motion of the heaven is necessary" [11, p. 101].[14] On this understanding, 'necessarily' modifies the motion of the heaven, which is a thing that belongs to the term 'moves', and it is an answer to the question "How does the heaven move?"—it moves necessarily—or "What kind of movement does

[10] For more on this point, and the consequences it has in terms of logical analysis, see [15].

[11] *ratione suae rei* [8, p. 74].

[12] *ratione compositionis suae vel in quantum est praedicatum* [8, p. 74].

[13] *Caelum movetur necessario* [8, p. 74].

[14] *significat quod motus caeli sit necessarius* [8, p. 74].

the heaven have?"—necessary movement. The sentence itself, though, is not modal; it is a simple assertoric sentence, which can be either true (if the heavens in fact do move necessarily) or false (if they either do not move at all or their movement is contingent).

In the second way, the sentence signifies "that the composition of the verb with the subject is necessary" [11, p. 101] [15], that is, "the heaven moves" is a necessary statement. (An analogous sophism, involving Socrates, running, and moving, is discussed in the chapter on conditionals [11, p. 125].)

The preliminaries being rehearsed, the primary focus of this chapter is an analysis of possible sophisms (logical puzzles or puzzles in analysis) that can arise from either conflating the syncategorematic and categorematic uses of a word, or from ambiguities resulting from combining the words with other syncategorematic words. The procedure is to raise a particular sophism and then solve it, and from this deduce certain rules governing the use of modal adverbs.

What is a sophism? Briefly, it is a sentence which has two seemingly equally plausible analyses that lead to opposite conclusions. (An example of a sophism familiar to modern readers is the Liar sentence: Both the analysis from which one concludes that it is true and the analysis from which one concludes that it is false seem equally plausible.) Medieval logicians used these sentences, and their opposing analyses, to distinguish good logical inference from sophistical inference. In the case of many of the sophisms discussed in this chapter, the existence of opposing analyses trades on a conflation of the syncategorematic and categorematic use of the same term. Other analyses involve scope ambiguities introduced by distributives (including quantifiers) and exceptives. In each case, Sherwood presents a sophism sentence, and then gives both a *probatio* 'proof' and a *contra* '[proof] contra'. We will follow suit in presenting the sophisms, in what follows.

4.1 The sophisms

The first sophism is this:

Sophism 4.1 *The soul of the Antichrist will be necessarily [11, p. 101].* [16]

Proof. Proof: The soul of Antichrist will have necessary being because at some time it will have unceasing, incorruptible being.

On the contrary, [the soul of Antichrist] will be contingently because it is possible that it will not be [11, p. 101]. [17] □

This sophism is solved by distinguishing the categorematic use of 'necessarily' and the syncategorematic use, as in the analysis of (1). If 'necessarily' is

[15] *quod compositio hujus verbi cum hoc subjecto sit necessaria* [8, p. 74].

[16] *Anima antichristi erit necessario* [8, p. 74].

[17] *Probatio: anima antichristi habebit esse necessarium quia aliquando habebit esse non cessans incorruptibile.*
Contra: contingenter erit quia possibile est ipsum non fore [8, p. 74].

taken categorematically, then it determines what type of being Antichrist's soul will have. For when Antichrist exists, their soul will have its existence necessarily, following traditional 13th-century thought that souls exist eternally, necessarily, and incorruptibly (cf., e.g., [7]). Thus, the *probatio* is correct under the categorematic analysis.

If, however, 'necessarily' is taken syncategorematically, then the *contra* is correct: "The soul of the Antichrist will be" is not necessarily true, because Antichrist's existence is contingent (and if they don't exist, then there is no soul will be 'the soul of the Antichrist').

In this sophism, we see a sentence that is true when the modal adverb modifies the predicate, but false when it modifies the sentence as a whole. In the next sophism, we see the opposite:

Sophism 4.2 *Contingents necessarily are true [11, p. 102].* [18]

Proof. Proof: 'Contingents are true' is necessary; therefore it will be true when it has been modified by the mode of necessity; therefore 'contingents necessarily are true' is true.

On the contrary, no contingents are necessarily true [11, p. 102]. [19] □

Both Sherwood's example and his argumentation is substantially compressed here, so let us unpick it. First, the fact that

$$\text{Contingents are true.} \tag{2}$$

is an indefinite sentence is important for its analysis; for Sherwood, such indefinite (unquantified) sentences "do not determine whether the discourse is about the whole [of the subject] or about a part" [10, p. 29]. Second, though Sherwood does not state this explicitly anywhere in either the *Introductiones* or the *Syncategoremata*, he takes it as given that contingent sentences are sometimes true and sometimes false. Thus (2) is not only a true statement, it is also necessary, for if a contingent sentence was never true, then it would not be a contingent sentence, and this is true of any contingent sentence. Since the statement is necessarily true, we can add the modal adverb 'necessarily' to it, scoping over the entire sentence, and maintain truth. This is the syncategorematic use of the term. However, if we take 'necessarily' categorematically, to modify the predicate 'true' only, then it is clear why the statement would be false: For no contingent sentence is necessarily-true. [20]

At this point, Sherwood introduces some new vocabulary to describe what's going on: He says that in the first case (when the term is interpreted syn-

[18] *Contingentia necessaria [sic] sunt vera* [8, p. 74].

[19] *Probatio: contingentia sunt vera; haec est necessaria; ergo modificato modo necessitatis erit vert; ergo haec est vera: contingentia necessario sunt vera.*
Contra: nulla contingentia necessario sunt vera [8, p. 74].

[20] Sentence structure in English is less flexible, and hence more ambiguous, than in Latin. When we intend the categorematic reading of 'necessarily' as a modifier of a subject or predicate term, we will hyphenate it with that term. When it is not so hyphenated, it should be read syncategorematically, as an adverb modifying the verb.

categorematically), the modal adverb 'necessarily' is being used as a *note of coherence*, because it modifies the coherence of the subject and the predicate. In the second case (when the term is used categorematically), it functions as a *note of inherence*, because it expresses something about how the predicate inheres in some subject (namely, necessarily).

The third sophism illustrates how modal adverbs interact with exclusive words such as 'only' (*solus*) or 'alone' (*tantum*).

Sophism 4.3 *Suppose that Socrates, Plato, and Cicero are running necessarily and that a fourth [man is running] contingently, and that there are no more [men]. Then only three men are running necessarily [11, p. 103].* [21]

Proof. Proof: Three men necessarily are running, [and no others necessarily are running;] therefore only three [men are running necessarily].

On the contrary, 'only three men are running' is contingent, because when the fourth is running it will be false and when he is not running it will be true; therefore it will be false when it has been modified by the mode of necessity [11, p. 103]. [22] □

In analysing this sophism, Sherwood points out that the inclusion of 'only' or 'alone' introduces an ambiguity depending on whether the modal adverb scopes over it or not. The distinction highlighted in the *probatio* and *contra* is between the categorematic usage, where 'only' modifies 'three men' and 'necessarily' modifies 'running':

Three men and no more than three men are necessarily-running. (3)

and the syncategorematic usage, where 'only' still modifies 'three men' but 'necessarily' modifies the entire sentence:

Necessarily: Three men and no more than three men are running. (4)

In (3), neither the exclusive nor the modal adverb are within the scope of each other; because each of the three men is individually necessarily-running, and no other man is necessarily-running, it is true that only three men are necessarily-running. However, in (4), the wide scope of the modal adverb makes the claim false, because there is no reason why the fourth man couldn't start running.

A similar analysis is given of the next sophism, which involves the exclusive 'alone' instead of 'only':

Sophism 4.4 *Necessaries alone are necessarily true [11, p. 103].* [23]

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[21] *Currant Sortes et Plato et Cicero necessario et quartus contingenter et non sint plures. Deinde: tantum tres homines currunt necessario* [8, p. 74].

[22] *Probatio: tres homines necessario currunt, ergo tantum tres.*
Contra: tantum tres homines currunt. Hoc est contingens, quia quarto currente erit falsa, et illo non currente erit vera: ergo modificato modo necessitatis erit falsa [8, p. 74].

[23] *Sola necessaria necessario sunt vera* [8, p. 74].

Proof. Proof: Necessaries necessarily are true, and no others [necessarily are true] (which is proved inductively); therefore necessaries alone necessarily [are true].

On the contrary, 'necessaries alone are true' is false; therefore, it will be false when the mode of necessity has been added. Alternatively: on the contrary, contingents necessarily are true since 'contingents are true' is necessary; therefore not necessaries alone [necessarily are true] [11, pp. 103–104]. [24] □

To see how this sophism is analogous to Sophism 4.3, it is sufficient to observe that the sophism sentence is equivalent to:

Only necessaries are necessarily true. (5)

The analysis of this sophism then can proceed entirely analogously to the previous one.

The final two sophisms that Sherwood considers in this chapter involve the interaction of modal terms with distributive ones. The most familiar distributive term is *omnis* ('all' or 'every'), and it is the topic of the first chapter of virtually every treatise on syncategorematic words (Sherwood's included), and both of the next two sophisms we look at involve this distributive term.

Sophism 4.5 *Suppose that all men who exist now are running necessarily as long as they exist, and similarly with respect to future men. Thus every man necessarily is running [11, p. 104].* [25]

Proof. Proof: 'Every man is running' is necessary; therefore it will be true when it has been modified with the mode of necessity. Then if Socrates is a man, Socrates necessarily is running [11, p. 104]. [26] □

Note that in O'Donnell's edition and in Kretzmann's translation, there is no proof *contra*. In the discussion of this sophism at [6, p. 480], an alternative reading of the Latin text is provided: *Contra: sed Sortes est homo, ergo Sortes necessario currit* ("Contra: But Socrates is a man, therefore Socrates is necessarily running"). [27] This alternative removes that curiosity in the O'Donnell-Kretzmann versions.

This sophism is solved by introducing a distinction between whether the necessity ties to the universal statement that every man is running or whether it ties to all of the singular statements that are implied by this universal statement

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[24] *Probatio: necessaria necessario sunt vera et nulla alia: quod probatur inductive; ergo sola necessaria necessario etc.*
Contra: sola necessaria sunt vera. Haec est falsa; ergo addito modo necessitatis erit falsa. Vel sic contra: contingentia necessario sunt vera quia haec est necessaria: contingentia sunt vera; ergo non sola necessaria [8, p. 74].

[25] *Verbi gratia, currant omnes homines qui nunc sunt necessario dum sunt, et similiter de futuribus hominibus; inde omnis homo necessario currit* [8, p. 75].

[26] *Probatio: haec est necessaria 'omnis homo currit'; ergo modificato modo necessitatis erit vera. Deinde: si Sortes est homo; ergo Sortes necessario currit* [8, p. 75].

[27] I would also like to thank one of the anonymous referees who provided me with this text and reference.

(e.g., "Socrates is running", "Sara is running", etc.), and Sherwood says that the same distinction applies to the next sophism as well:

Sophism 4.6 *Every man of necessity is an animal, but Socrates is a man; therefore Socrates of necessity is an animal [11, p. 105].* [28]

Here is a bit of a surprise: While these two sophisms involve the same distributive term, they don't both involve modal *adverbs*—this despite the fact that we noted above that Sherwood, both here and in the *Introductiones*, restricted the definition of 'mode' to include only adverbs. The second of the two sophisms uses the phrase *de necessitate* 'of necessity' instead of the adverbial form *necessario* 'necessarily'. What we should conclude here is that these two phrases, despite their grammatical differences, do not differ in their logical import.

4.2 The Rules

From consideration of these six sophisms, Sherwood gives the following rules that govern the use of these adverbs, both on their own and in conjunction with other syncategorematic words:

Rule 4.1 *The word 'necessarily' can sometimes be a note of coherence and at other times a note of inherence [11, p. 102].* [29]

This rule is illustrated by Sophism 4.2.

Sophisms 4.3 and 4.4 form the basis for the next rule:

Rule 4.2 *Sometimes there is an ambiguity in that the word 'necessarily' can include the word 'alone' or 'only', or vice versa [11, p. 103].* [30]

Finally, sophisms 4.5 and 4.6 give rise to the following rule:

Rule 4.3 *Sometimes ambiguity occurs in that the word 'necessarily' can either include a division or be included by it [11, p. 104].* [31]

These rules are disappointingly banal, especially in the context of Kretzmann describing the *Syncategoremata* as "an advanced treatise". They certainly don't seem to be very advanced principles, or have the feeling of something being discovered through the analysis of these sophisms: Surely anyone after a modicum of reflection could tell you that syntax (whether Latin or English) is in many cases inherently ambiguous. What do we gain from identifying these principles and classifying them as logical rules, elevating them above other principles?

It's hard to give a satisfactory answer to this question. When one looks at a historical logic text, one always hopes to gain insight not only into the history of the field but into the field itself; but it is not clear what we can learn from

[28] *Omnis homo de necessitate est animal; sed Sortes est homo; ergo Sortes de necessitate est animal* [8, p. 75].

[29] *Item regula quod haec dictio 'necessario' quandoque potest esse nota cohaerentiae, quandoque nota inhaerentiae* [8, p. 74].

[30] *Item quandoque est multiplicitas eo quod haec dictio 'necessario' possit includere hanc dictionem 'solus' sive 'tantum', vel e converso* [8, p. 74].

[31] *Item quandoque accidit multiplicitas eo quod haec dictio 'necessario' possit includere divisionem vel includi ab ea* [8, p. 75].

Sherwood here. The chapter on necessity and contingency does not, itself, tell us much more than what we already knew, or could have easily discovered on our own through reflection on the material presented in the *Introductiones*.

Perhaps an alternative question to ask is not what *we*, as modern logicians, can learn from looking at this text, but rather what Sherwood and his contemporaries could learn from going through these exercises. Here the answer is clearer: Analysing these various sophismata makes explicit the need to be precise about the interaction between modality and quantification, so that propositions involving both can be properly disambiguated. In this respect, one could compare the developments of Sherwood and his contemporaries with the modern-day developments in quantified modal logic due to Barcan Marcus. [32]

5 Necessity and contingency elsewhere in the *Syncategoremata*

But the chapter of necessity and contingency is not the only place in the *Syncategoremata* where modal terms are discussed. Just as this chapter included rules governing how modal adverbs interact with other syncategorematic terms such as 'alone' or 'every', chapters covering other terms sometimes include sophisms involving modal adverbs or other modal terms. In this section, we outline these sophisms and use their analyses to augment the overall picture we're developing.

In the chapter on conditionals, Sherwood distinguishes natural and nonnatural consequences and this distinction relies on modal notions. Natural consequences are those where "the consequent follows from the antecedent in respect of some state of the one relative to the other" and in this case "it notes an ordering of things in reality" [11, p. 123]. [33] Nonnatural consequences, on the other hand, are those where

> the consequent follows from the antecedent not in respect of a state of the one relative to the other but solely because of the impossibility of the antecedent or the necessity of the consequent... it notes an ordering of things in discourse [11, p. 123]. [34]

That is, nonnatural consequences are ones that rely on the principles of *ex impossibili quodlibet sequitur* and *necessarium ex quolibet sequitur*.

In this chapter, he also offers a distinction between conditional propositions and categorical statements with conditional predicates [11, ch. XVII, §§16, 17]. He considers the following sophism:

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[32] Thanks to one of the anonymous referees for suggesting this more positive way of looking at Sherwood's contribution.

[33] *consequens sequi ad antecedens ratione alicujus habitudinis unius ad aliud... notat ordinem rerum secundum rem* [8, p. 80].

[34] *consequens sequi ad antecedens, non ratione habitudinis unius ad aliud, sed solum propter impossibilitatem antecedentis vel necessitatem consequentis... notat ordinem rerum secundum sermonem* [8, p. 80].

Sophism 5.1 *What is true is false if Antichrist exists [11, p. 122].* [35]

The proof *contra* relies on blocking the modal inference from a contingent statement to an impossible one: "the antecedent [Antichrist exists] is contingent, and what follows [what is true is false] is impossible; therefore the conditional is false" [11, p. 122]. [36] This same principle is appealed to in solving a sophism in §13 of the same chapter; here we also find another modal principle, related to the one used in the definition of nonnatural consequences, invoked: "the antecedent is impossible, therefore the conditional is necessary" [11, p. 124]. [37] These two are just examples of true nonnatural consequences, as discussed above.

In the chapter on 'unless' (*nisi*) [38], we find the correlate of the principle just described: a conditional is false when "the antecedent is necessary and what follows it is contingent" [11, p. 129]. [39]

Finally, in the chapter on disjunction, Sherwood notes that disjunctions combined with modal terms are ambiguous between scoping over the whole disjunction or the individual disjuncts; a sentence where the modality has wide scope can be true without the corresponding sentence with narrow scope being true. That is, he rejects the (obviously invalid) inference:

$$\vDash \Box(p \vee \neg p) \qquad \Rightarrow \qquad \vDash \Box p \vee \Box \neg p \tag{6}$$

The example he gives is [11, p. 147] [40]:

That Socrates is running or not running is necessary. (7)

What is interesting here is that he follows this example up with two more example combinations of a modal term with a disjunction, but this time (one of the only times in the text) the modal term is not alethic, but epistemic [11, pp. 147–148] [41]:

You know that the stars are even or uneven [in number]. (8)

and

That the stars are even [in number]
or that the stars are odd [in number] is known to you. (9)

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[35] *Verum est falsum si antichristus est* [8, p. 80].

[36] *antecedit contingens et sequitur impossibile; ergo conditionalis falsa* [8, p. 80].

[37] *antecedens est impossibile; ergo conditionalis necessaria* [8, p. 81].

[38] An interesting chapter in itself, for anyone who has had to motivate to undergraduates why 'unless' in English can be translated into a conditional with a negated antecedent; in Latin, *nisi* is literally a compound of the negative particle *non* 'not' plus the conditional marker *si* 'if'.

[39] *antecedit necessarium et sequitur contingens* [8, p. 83].

[40] *Sortem currere vel non currere est necessarium* [8, p. 89].

[41] *Tu scis astra esse paria vel imparia... astra esse paria vel astra esse imparia scitur a te* [8, p. 89].

These are classic examples of sentences where one of the disjuncts must be true, but which one is true is not known. Unfortunately, Sherwood does not otherwise discuss epistemic modalities, in this text or in the *Introductiones*.

To sum up: In other places in the *Syncategormata* where modal terms occur, we can see Sherwood relying on the following modal inferential principles:

Rule 5.1 *Impossibility never follows from contingency.*

Rule 5.2 *Contingency never follows from necessity.*

Rule 5.3 *Any conditional with an impossible antecedent is necessary.*

As with the case of the rules deduced at the end of the previous section, these are neither especially interesting nor especially novel rules to pose: They are quite basic and quite orthodox.

What we saw both in this section and in §4 is not a systematic approach: For the rules are derived from the analyses as consequences of them, rather than the rules being stipulated in advance and then used to analyse the sophisms. Additionally, there is a lack of systematicity in terms of completeness: There is no guarantee that the sophisms considered in this text exhaust all of the possible sophisms that arise from the use of modal adverbs.

This lack of systematicity may cause a contemporary logician to bristle: For logicians are, if anything, systematic. One could even use this lack of systematicity to dismiss Sherwood as a worthwhile object of study. In my final remarks below, I would like to briefly argue that even if what we have found in this analysis seems straightforward and banal, there is still value to be gained from having undertaken this study.

6 Some final remarks

In this paper, we have revisited William of Sherwood's modal theory through the lens of what he has to say about necessity and contingency in his later treatise, the *Syncategoremata*. This deepens our understanding of Sherwood's account of modality which we originally discussed in [14]. The primary features of Sherwood's views on modal terms in the *Syncategoremata* are a distinction between the categorematic use and the syncategorematic use of modal adverbs, which is used to solve various sophisms, and rules that govern the interaction of modal adverbs with distributive and exclusive terms. From this, we can see Sherwood's close attention to the ways in which modal terms are used in actual discourse and where sophistical reasoning can arise from ambiguity or equivocation. This highlights a possible explanation for why Sherwood's approach lacks the systematicity that modern logicians strive for in their theories: Sherwood is fundamentally interested in analysing language in discourse, and language is inherently unsystematic. There is no way to survey all possible sophisms involving modal terms; but it is possible to highlight common problems and errors that people can make, and to provide rules for recognizing and avoiding those problems. In fact, the lack of systematicity and completeness can be seen as a virtue: By identifying types of sophisms and types of problems, and rules

to deal with these, Sherwood makes it possible for us to extrapolate fro these rules to novel situations. What results may not be terribly interesting modal logic, but *is* of straightforward use and application in ordinary everyday modal reasoning.

In an ideal world, I would have included a comparison, at the end of this paper, of what Sherwood has to say on these topics with his colleagues in the Big Four, Peter of Spain, Lambert of Auxerre, and Roger Bacon. All four men covered similar topics in their introductory textbooks and treatises on syncategorematic terms, and a comparison of the other three with Sherwood is often in valuable because there are clear paths of influence from Sherwood's *Introductiones* to the other texts and because Sherwood's views, as some of the earliest, are often both more nascent and more interesting. Furthermore, Kretzmann puts forth an argument that Sherwood's *Syncategormata* post-dates Peter of Spain's *Tractatus Syncategorematum*; but whichever is earlier, Kretzmann says it is clear that "the study of either man's work on syncategorematic words is greatly aided by a close comparison with the work of the other" [11, p. 7].)

Unfortunately, this research was not produced in an ideal world. This paper was completed while I was in isolation due to Covid-19 lockdown measures in the United Kingdom, with the books that I would have needed to reference inaccessible in my office.[42] I believe, nevertheless, that an analysis of Sherwood's views alone is still of research value and of historical interest, and that noting the shortcomings of the present paper can serve as a reminder to future readers that research is not produced in a vacuum, but depends on so many vital factors all coming together in the right way at the same moment—time to work without constant interruption from a child, access to the right books, space to work without wondering when you or one of your family members will be the next person you know who is sick. When all these factors are lacking at the same time, the result is papers whose scope must perforce be more modest.

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